

Prematurity of 23 or less weeks' gestation is a risk for transient late-onset hyperglycemia in neonate



Takeru Yamauchi¹⁾, Kei Takasawa¹⁾, Manabu Sugie²⁾, Masatoshi Imamura²⁾, Atsuko Taki¹⁾, Kenichi Kashimada¹⁾

1) Department of Pediatrics and Developmental Biology, Tokyo Medical and Dental University (TMDU), Tokyo, Japan
2) Department of Neonatology, Tsuchiura Kyodo General Hospital, Ibaraki, Japan

Take Home Message

"Transient prolonged hyperglycemia in neonates (TPHN)" would be a novel form of hyperglycemia among extremely preterm infants, that requires aggressive therapy, such as insulin.

Transient hyperglycemia of preterm infants

- Transient hyperglycemia is common among very low birth weight infants (LBWI)¹⁾.
- Occasionally, we experienced atypical transient hyperglycemia that is prolonged and severer than "classical" transient hyperglycemia.

>> A different form of neonatal hyperglycemia?

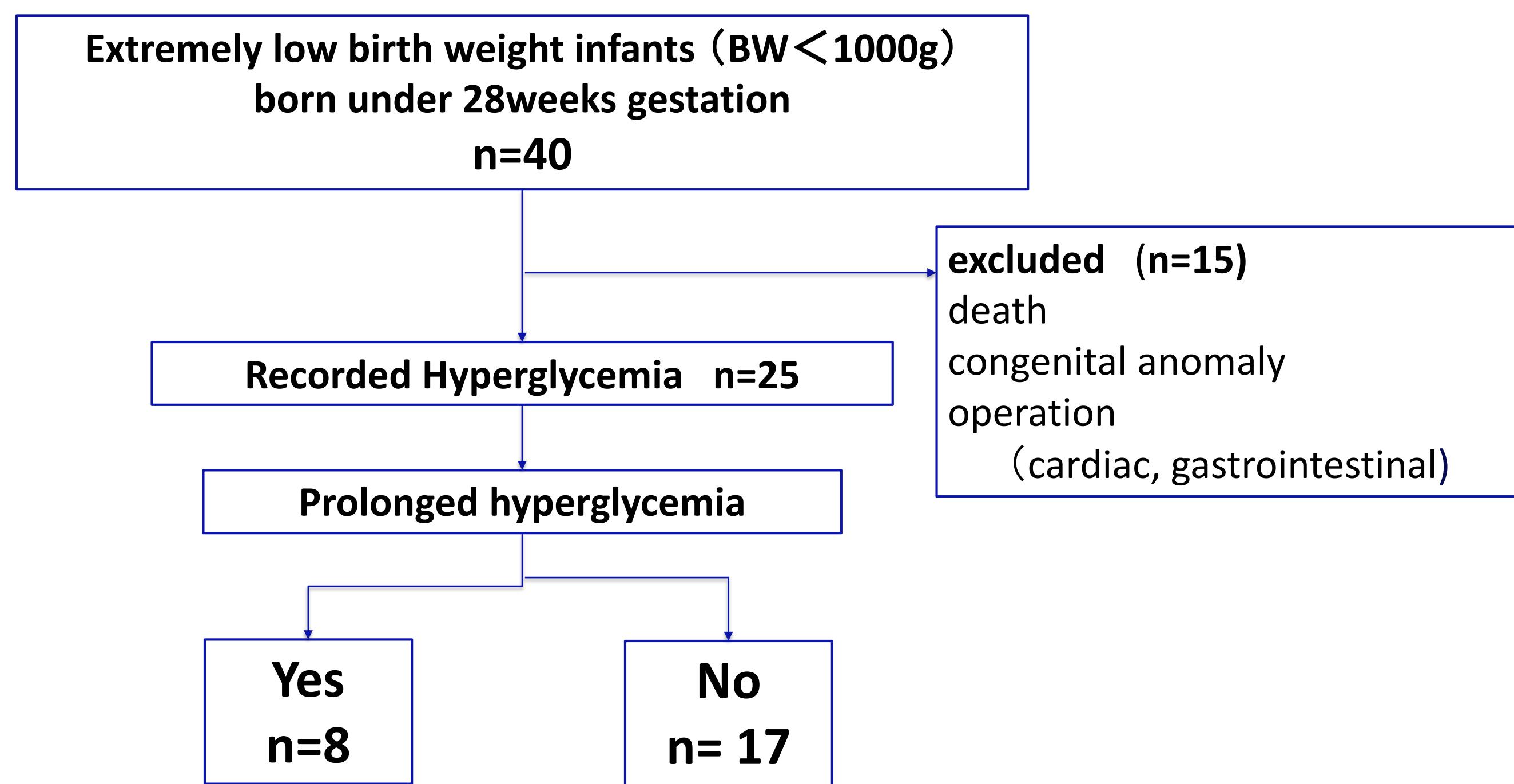
"Classical" hyperglycemia		Prolonged hyperglycemia
Duration	• Less than 1 week	• More than 1-2 weeks
Risk	• Very low birth weight infants	• unknown
BS level	• 200~300mg/dl (11~16 mmol/l)	• insulin
Cause ²⁾	• Excess of glucose infusion • Drugs (catecholamine, steroid) • Hyperactivation of gluconeogenesis • High insulin resistance • Low insulin secretion	
Treatment	• Reduction of glucose infusion rate • insulin	

Aim of this study

Identifying risks and clinical features of prolonged hyperglycemia

Method

- Study population: Extremely preterm infants (<28weeks) admitted to a single Neonatal Intensive Care Unit in Japan
- Duration From Apr. 2015 To Mar. 2018
- Method: Retrospective analysis based on medical records



- Prolonged hyperglycemia: prolonged more than 1-2 wks + persistent after withdraw of parenteral nutrition
- Hyperglycemia: More than 180 mg/dL (10mmol/L) of preprandial glucose levels was sequentially demonstrated twice or more

Clinical features of Prolonged Hyperglycemia

Duration: > 6 weeks

Treatment: required aggressive insulin infusion therapy

	"Classical" hyperglycemia		Prolonged hyperglycemia		P value
	Median	(25-75 %tile)	Median	(25-75 %tile)	
Total days with hyperglycemia	3.0	(2-4)	47.5	(21.7-63.0)	<0.001
Maximum duration (days)	2	(2-3)	44	(17-56)	<0.001
Age at remission (corrected GA)	27w1d	(25w6d-27w6d)	30w1d	(29w3d-33w0d)	<0.001
Insulin therapy	4 (23%)		7 (87%)		0.007

Fischer's exact test, Mann-Whitney U-test

Exacerbated after the transition from parenteral to enteral nutrition

At the peak of hyperglycemia	"Classical" hyperglycemia		Prolonged hyperglycemia		P value
	Median	(25-75 %tile)	Median	(25-75 %tile)	
Age (day)	5.0	(4-7)	15.5	(9.7-17.5)	<0.001
Blood sugar level (mg/dl)	272	(241-304)	461	(415-499)	0.007
Glucose infusion rate (mg/kg/min)	5.7	(4.3-6.6)	0.7	(0-2.3)	0.008
Enteral feeding (ml/kg/day)	25.0	(7-38)	114.5	(93.2-127.5)	0.010

Mann-Whitney U-test

Risks of Prolonged Hyperglycemia

Risks: Extreme preterm (GA≤23W), and lower birth weight

	Classical hyperglycemia		Prolonged hyperglycemia		P value
	Median	(25-75 %tile)	Median	(25-75 %tile)	
Gestational weeks	26w1d	(24w0d-27w0d)	23w3d	(23w2d-23w4d)	<0.001
Birth weight (g)	765	(615-837)	595.5	(546-619)	<0.001
SGA	35%		0%		0.064

Fischer's exact test, Mann-Whitney U-test

Not significant: maternal antenatal steroid administration, intravenous glucose/ amino acid/ fat infusion rate, catecholamine / steroid / caffeine administration,

Discussion

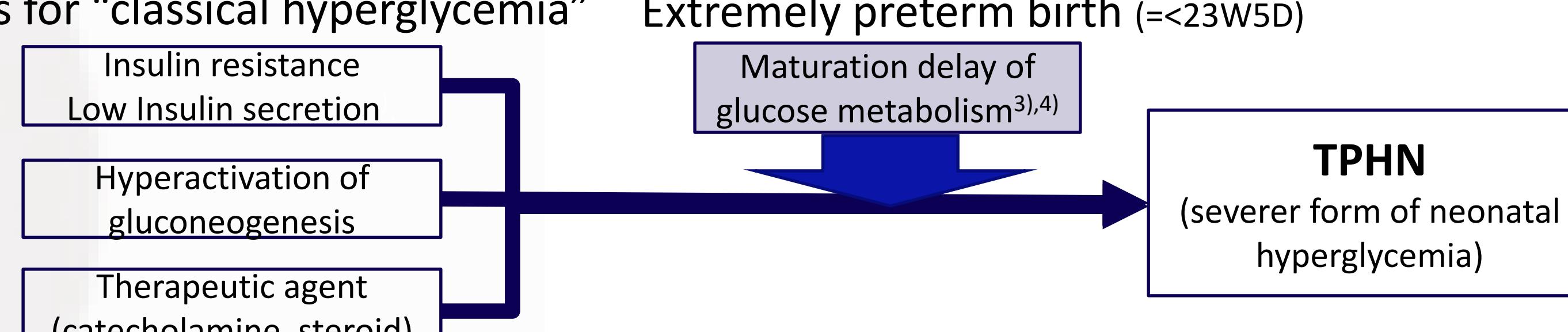
- Based on our observation, we propose a novel type of transient neonatal hyperglycemia, "Transient prolonged hyperglycemia in neonates (TPHN)"
- It is characterized by
 - Persistent more than 6 weeks
 - Prolonged after the transition from parenteral to enteral nutrition
 - Requires aggressive treatment, such as insulin infusion.
- Risk factor: Extremely Preterm (23w5d or less)

Reference

- [1] Hays et al. Pediatrics 2006; 118(5): 1811-1818
- [2] Meetei et al. Biol Neonate 1998; 74: 214-21
- [3] Mola-Schenzle et al. Arch Dis Child Fetal Neonatal Ed 2015; 100: F126-F131
- [4] Beardshall et al. J of Paediatrics 2010; 157(5): 715-719

A possible hypothesis for TPHN pathophysiology

Risks for "classical hyperglycemia" Extremely preterm birth (<23w5d)



Possible reasons why few studies reported TPHN to date

- Limited number of viable neonates who were born 23w or less of gestation
- As improving viability of extreme preterm infants (<23w), the number of neonates with TPHN will increase.
→More detailed multicenter-studies are required

Poster presented at:



Poster Session Online